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STUDIES IN HIGH-SCHOOL PROCEDURE—MASTERY

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In the two preceding articles of this series, I have discussed certain fallacies involved in high-school procedure and have attempted to show how they result in a kind of half-learning or no-learning which is cumulative in effect and which probably has disastrous influence upon the character of society in an age of universal education.

In the January number of the *School Review* I discussed the fallacy of lesson-learning and exhibited some evidence tending to show that there is little or no necessary relation between the learning of a lesson and the achievement for which that lesson or series of lessons is supposed to stand. I characterized lesson-giving as indirect teaching. I shall set forth in this article in substance what I mean by direct teaching.

In the February number I pointed out the fallacies involved in current marking, grading, and promotion; in the misuse of the normal distribution surface in school administration; in the abuse of intelligence or mentality ratings; and in ground-to-be-covered and time-to-be-spent and method-to-be-used. I attempted to show how the whole congeries of fallacies, the legitimate outcome of the graded system of school government and administration, has caught us in such a net that we cannot teach thoroughly if we would.

We need then, first of all, to get back to some solid ground from which we can make a fresh start in our thinking, if not in our practice. We can find that solid ground in the concept of mastery, in the old notion that what is worth doing at all is worth doing well. We at once, then, get away from percentages and passing marks and know only one objective, and that getting the thing done. You either understand a principle or you do not; there is no such thing as 70 per cent understanding. You can either do a thing or you cannot; there is no half doing it nor three-quarters doing it. You may understand more of a subject than another, you may do a thing better than another; but understand or do you must. Mastery of Freshman mathematics does not imply mastery of the whole subject of mathematics. Ability to write the English language correctly does not imply ability to write it elegantly or forcefully. But every stage has in it the possibility of mastery at that stage. The youth who can write English, or translate Latin, or read French, or understand the principle of gravitation, 70 per cent as well as he is supposed to write or translate or read or understand has not achieved at all. He has only begun to achieve. Nor does mastery in school work involve any serious difficulties. It does involve a new conception of teaching and a new orientation in administration. It involves ceasing to measure a pupil by his average mark and measuring him by the excess quality of his achievement. It involves ceasing to evaluate our success by averages or medians of class achievement and beginning to measure ourselves, as other scientific workers do, by the percentage of our failures. And, be it said, we shall always have a percentage of failures.

The first step is, then, to have clearly in mind our teaching objectives. In any case an objective will certainly not be a bit of ground to be covered more or less well. In every case, it will be either a principle or body of principles to be understood or a power to be gained. The primary teacher has long had this as her objective. She seldom thinks she has accomplished anything by mere dint of hearing her class read through a book. Her objective is teaching her pupils to read subject-matter which is within their comprehension, and she commonly succeeds. And so the high-school teacher of mathematics has as his legitimate objective the understanding by all pupils of a succession of mathematical principles, not the correct working of a given number of exercises. Some may need to work more and some less, but each will work no exercise which will not contribute definitely and clearly to his particular understanding of the principle. Similarly, the teacher of French has as his objective the power of all pupils to read French, or, it may be, to speak French. He marshals all his material with that end in view. He either succeeds or he does not. Each student either succeeds or he does not. The teacher does not venture to assign and hear lessons from a book, or hear pupils practice reading, and then conclude that all who have learned their lessons 70 per cent as well as they might have learned them can read French. As a matter of fact, most of them in such cases cannot read French, and later on others find it out.

We shall recur to the point later, but let us note here that the commonest ground of failure in teaching which has mastery in view is mistaking the material of learning for the actual objective. It is the persistence of the old fallacy of ground-to-be-covered.

Having settled upon our objectives and trained ourselves to keep them always in mind—in teaching, in supervised study, in testing—the next step is to outline our course in manageable units or blocks, and here a great deal of careful, reflective, scientific work needs to be done. If we are going to lead our pupils to mastery, we cannot do it at a single long leap lasting over a semester or a year. We must be able to check up from time to time.

In the content subjects and in subjects like mathematics or grammar, these units will be units of understanding rather than pages or chapters to be covered. Mathematics and grammar have always tended to do this. The sciences have approached it. History and literature have scarcely essayed it. Few texts in science or history or literature are written with such organization in view. I suggest typical units chosen from the current semester in our laboratory school.

A preliminary unit in elementary science, seventh grade, is the water supply. In the end, the objective is a picture in the pupil's mind in which are exhibited water running from the tap, its source, how it gets to the tap, and what makes it behave so. Closer scrutiny reveals one or more types of pump, the siphon, and various typical sources. The ultimate test is the pupil's ability to write a paper in the classroom, without notes or references, describing the whole process. If the picture is clear in his mind, he does the paper without trouble; if the paper is not clear, he does not understand.

In a later course, in physics, the unit is more abstract. A typical unit is density. In the end, if the pupils understand, they are able to discuss verbally or in writing, in a clear-headed manner, any ordinary situation involving the principle itself. The objective is the principle, not the customary lessons assigned and recited. Be it said that the teacher was obliged in the case in mind to go over the matter again and again before he succeeded in getting the desired "clear-headedness" in a part of the class.

In a course in modern history, a certain unit is the Industrial Revolution, and the objective is the understanding of the Industrial Revolution, with implications the same as in the case of the two science courses. A history unit to be *understood* contrasts sharply with a chronological series of historical events to be memorized.

In a course in any of the language arts, such as writing English, reading French, translating Latin, the objective, and the unit to which it corresponds, is ability to read, or write, or translate discourse of a given grade—correctly and understandingly and, of course, at sight.

In a course in literature, the unit is a given masterpiece, and the objective is clear appreciation of the meaning and message of the masterpiece. If the class, or a portion of the class, does not, on the appropriate test, appear to feel the message, then the teacher recognizes his own failure and goes over the unit wholly or in part again. In some cases—in the larger number, in fact—the objective is not appreciation of a given masterpiece but the cultivation of a taste for a certain kind of reading in a given pupil. The unit here is perhaps as long as the school life of the pupil. It is perforce individual work, and the teacher persists with his extensive reading procedure until he has attained his objective. A given pupil may show, frequently does show, little need of schooling in this direction. He is already a wide reader of growing and catholic tastes. He is released entirely from the regulation school requirement in this direction.

We have now organized our courses in blocks or units, each of them capable of mastery in terms of understanding or capacities or appreciation. We are now interested in the general procedure through which we may be able to lead a class to mastery. The specific daily technique of classroom teaching and oversight is vastly important, but we shall have space scarcely to more than touch that whole subject.

The procedure may be summarized in the formula: Teach, test, and teach again if necessary.

Picture the physician in his management of a case. He diagnoses, prescribes, examines, modifies his treatment, and so on throughout to recovery or to the discovery that the patient is beyond his aid. We have a situation which is much the same. Our patient is a class of boys and girls. Recovery is mastery of a unit. Initial diagnosis shows us the present intellectual condition of the class and of the individuals of the class in terms of the objective to be attained. Treatment is teaching and supervised study. Examination of blood and urine, of heart action, and temperature, is in our case the laying of a teaching test to ascertain the effect of our teaching. The physician continues or modifies his treatment according to the revelations of his examinations. We modify our teaching in accordance with the evidence from our tests. The physician sometimes finds that his patient exhibits peculiar symptoms for which he cannot account, and he calls in a specialist. We have the same experience and are able to get some help, not much as yet, from the psychologist or the physiologist. The physician sometimes finds bodily conditions which make a cure impossible in the light of present knowledge. And so do we. We find a very low I.Q. with a bad corroborative family and school history, and we at once disclaim all ability to give the pupil an ordinary education. We do not give him a grade of even 50 per cent. The physician sometimes loses a patient and is unable satisfactorily to account for the failure. He has a very much better body of professional lore than we, and yet he fails. And we sometimes fail—not with the class but with an individual.

What sort of a test do we give? That all depends upon the situation in which we find ourselves. The teacher must devise a new test and a different test for practically every phase of his progress through the block which he is teaching. He is always looking for specific light on a specific problem. To fall back on ready-made tests habitually is to become an indolent formalist of the most pronounced type. His test is usually a teaching test and not a test for grading his pupils. Properly speaking, the pupils should never know when a test is coming, should never know when they are being tested, should never know the result, except by inference. Of course, this is an ideal hardly attainable in full in practice, and I am speaking of teaching tests and not of examinations. The objective before the pupil's mind is understanding or power, not the opportunity to compare his work with his fellows' marks. About the only case in which there is genuine pedagogical advantage from attracting the pupil's attention to his own standing is that in which he can readily gauge himself directly and not by comparison with his neighbor. The best illustration here is the handwriting scale.

The teaching test is of value only as evidential material. Its value as an absolute criterion is almost nil.

In the first place, only the evidence which is material is considered. In a mathematics test, the clerical errors may be so many that no question could be graded perfect, if we were grading at all, and yet the evidence of the test may point to perfect comprehension. The clerical errors are evidence of carelessness and the pupil will have to do the work over again until he can put in a perfect paper, but as evidence to the main point at issue they are excluded.

A test is but one piece of evidence, albeit the most important piece. The teacher must be so good a supervisor that all through the supervised-study period he has been gathering in his mind a mass of evidence such as to make the test almost a foregone conclusion. A pupil may pass in a flawless paper, and yet, in the light of corroborative evidence, the teacher may be justified in concluding that the pupil is weak in several points. On the other hand, a pupil may fall down completely on one or more points and yet, in the light of corroborative evidence checked up by subsequent questioning, the teacher may conclude that the pupil is perfectly sound. Even with the finest instruments of precision known to science, applied to the measurement of unyielding and unvarying objects, the physicist or the astronomer is not content with a single observation.

The teaching test itself must be under constant scrutiny. He is a wise teacher who can make a test, no part of which ever miscarries. It is only by long practice in making tests in the schoolroom that the teacher arrives at the point where his percentages of miscarriages are at a minimum.

The point at which the average teacher finds it hardest to acquire a new orientation is in his own attitude to the results of tests. Teachers think of tests as means of measuring pupils. A teaching test is always a means of measuring teaching, only that and nothing more. The moment it becomes, either in the mind of the teacher or the mind of the pupil, a means of measuring the pupil, at that moment it loses its evidential character and becomes worthless.

The physician often comes upon a refractory case. He is puzzled and is obliged to study the patient anew. So the teacher finds that well-nigh every course develops problems. In spite of all he can do, certain individuals fail to respond. Testing then gives place to a study of these individuals.

Modern psychology and physiology have equipped us with instrumentalities for the study of individuals better than we once dreamed we could be equipped. We can study the whole sensory apparatus of the pupil. We can investigate the condition of his neuro-muscular system. We can, if need be, investigate his mental condition and detect disturbing psychoses. We can ascertain his relative brightness or dullness. We can discover the condition of his nutritional processes and sometimes account for languor and apparent indolence on that ground. We know something of what we may expect from the normal circumstances of his period of development. But, perhaps better than all else, the teacher is learning how to put on an analytic frame of mind and view the pupil dispassionately as a reacting organism in process of growth rather than as a youth with a more or less perverted ripened character. And in one very important field—indeed, the most important of all—the teacher is himself the best specialist. I refer to the field of intellectual development as distinguished from the fields of mental and physical development. In a word, the teacher is best competent to judge the effect of the pupil's earlier intellectual history upon his present capacity to learn. And so with a typical problem—and the real problems number but little more than 5 per cent of the whole number of pupils—we proceed somewhat in the following manner.

First of all, we assure ourselves as well as we can of the sensory and physical soundness of the pupil. There may have been unsuspected eye or ear trouble extending over a period of years, sufficient to account for the origin of the difficulty. The pupil's home habits may have produced a general disturbance of nutrition and elimination of waste products, sufficient to account for poor learning power. And so with many other disturbing factors of a purely physical character. It is essential that physical factors should first be eliminated, for they are in the nature of things fundamental.

That done, the next question is, "Is the child natively stupid to a degree sufficient to account for low learning power?" The teacher can in the majority of cases rule that question out on grounds of lack of corroborative evidence. In some cases the corroborative evidence all points to the conclusion that he is stupid, and then comes the need of several mentality tests. If the consistent result is an I.Q. of 100 or over, the stupidity theory is definitely ruled out. If the I.Q. is less than 100, the presumption tends to be confirmed and, if very much less, say 75, there is ground for further study by a specialist with a view to the determination of possible mental deficiency. In case of consistently determined dullness, there ceases to be profit in the pupil's continuing a course with normal children.

The next consideration in our practice is probably simple laziness. If the evidence points in that direction at all, the trouble is soon identified, for most children are more ready to admit laziness than any other one cause—sometimes overready to do so. Appropriate punitive measures are then indicated with, in most cases, beneficial results. I use the expression "simple laziness" to differentiate from indolence which is the result of nutritional or developmental disturbances. I do not count "simple laziness" as a "real problem."

We then pass to the large field of intellectual causes—large because of the number of cases which we find within its confines in any school which has been conducted on the lesson-learning theory of instruction with a "passing mark" of 70 per cent. Inability to learn in an advanced course is more than likely to be due to poor work in an earlier course in the same subject or to grossly bad study habits, or to the fact that the pupil is a "lesson-getter." There are three items here then.

The pupil cannot learn because he is a confirmed "70-percenter," or "80-percenter," or "gentleman's mark" youth. The genus is too well known to require description. Many high-school and college children are adepts at "just getting through." They have a perverse skill in doing just the right amount of work to avoid being dropped. They cannot learn beyond that point because their stock of ideas is insufficient to establish an apperceptive connection with a new stock. Their cases, so far as the new course is concerned, are precisely as hopeless as those of the mental deficients. These are the intellectual deficients. Our course is to set them back into an elementary course as soon as they are identified. It is explained to them that they will be able to work there and are not able to work here. The idea of punishment is kept out of range. We are endeavoring to get the word "flunk" out of the vocabulary. You don't flunk; you are simply set back a year because you can learn there and cannot learn here. It is very interesting to see the psychological change going over the spirit of the school. One has to orient himself anew when he finds that any day may find him in the next lower division and that he no longer postpones the settlement of his intellectual affairs to a distant semester end or year end. Besides, while there is a certain rakehelly grandeur about the persons of the flunkers when the report cards come out, there is no romance at all in being numbered with the Freshmen next Monday in French or mathematics or physics. These cases are not counted as real problems.

The case of the lesson-getter is pathetic, for he, or more often she, is a dutiful soul who has long followed false gods in sincere devotion. Ordinarily, such people are apt to lose caste somewhat, for their abilities are frequently not of the sort which respond to the requirements of mastery when understanding and power and appreciation are the objectives. Their cases require a great deal of understanding and intimate personal work; and, because they are by nature dutiful and ambitious, they soon respond.

The third type, those with bad study habits, or no study habits at all, are slowly brought into line, provided the teacher is willing and able to become a real supervisor of study and to renounce the easy task of assigning lessons to be prepared at home where all control of the learning process is lost. Study is a habit, acquired through practice and not through understanding. It is a matter of training, and training can be carried on only under oversight.

There remain the baffling problems, like the cases which puzzle the physician. In some of them, the right specialist could probably throw light if we could find the right specialist who is also a teacher. This is the great unexplored field in which the remedial teacher of the future will work, a field which promises rich returns in scientific achievement and human betterment. I can think of no greater professional satisfaction than that to be found in setting right some of these unhappy "queer sticks" in our high schools and colleges.

Testing and pupil study of the sort we have been describing, of course, go on more or less constantly. To the mind of the alert teacher, who has become thoroughly indoctrinated with the scientific attitude toward teaching, every day's work is full of evidential material bearing on the progress toward mastery, and any day may throw light on one of his pupil problems. The important question is, What is the teacher to do with the results of his tests and the evidence in his possession? The answer is in the third member of our formula, "Teach, test, and teach again." He does teach again, at the points and to the individuals indicated by his tests. He may teach orally, he may assign reading or exercises; but whatever he does, he does with an eye to bringing out the understanding or the power or the appreciation which is his objective.

I am indebted to Miss Mary G. Hamilton of the English department of our laboratory for the following account of the application of the formula to a case of appreciation in literature.

> In English 11A, I assigned an oral report on any play of Shakespeare. Two-thirds of the class at the first attempt failed to realize the essential excellencies set up for a perfect book report. The next day these two-thirds repeated their talks, having in the meantime reworked or reconsidered them. Only three students failed this time. On a retrial all of these three did well. I might say that several of the two-thirds on their second attempt quite outstripped any students who were successful at the first attempt.
>
> Two weeks later I had other talks in this class and only one student failed at the first attempt. These latter talks were beyond words accurate, charming, and artistic. Every child was original in his attempt to be adequate.

Miss Hamilton's case which I have cited is typical.

We are, at the time of writing, Christmas holidays, twelve weeks along on this phase of our experiment, and certain gains of power in pupils are clearly evident.

In the first place, in some courses, pupils reach mastery on a given unit, or sub-unit, much earlier than they did. In the beginning, nearly every unit had to be taught over again and sometimes two and three times and even more. On the first round, roughly about one-third of a given division would show the 100 per cent required. This ratio is being reduced, and cases occur in which the entire class show mastery on the first round, except perhaps on a single point and on that substantially the whole class fails, thus revealing an oversight in teaching which the teacher is glad to detect.

Mr. Wilbur L. Beauchamp, of the science department, furnishes me the results quoted below on a presentation in the junior high school, Grades VII and VIII. The topic was combustion, in elementary science. The class was approaching the topic for the first time. Mr. Beauchamp taught, in my presence, covering the whole unit which would be the subject of study for perhaps one to two weeks. His presentation required thirty-five minutes, the pupils taking notes. Attention was constant and high until the very end of the period when it wavered somewhat but not seriously. The following day the pupils began writing up in supervised study in narrative form, their notes being their only help. This narrative was their presentation test, and the situation was such that a pupil could write the complete story only if he could picture to himself a clear understanding of the presentation with its main points and subsidiary implications as covered by the teacher. I quote Mr. Beauchamp's analysis.

> The big ideas which were presented were as follows:
>
> 1. Some substances burn and some do not. Those substances which burn are fuels.
>
> 2. Every substance has a temperature at which it will "catch fire." This is the burning temperature.
>
> 3. Air is necessary for burning. Oxygen is the active part of the air.
>
> 4. Burning is the combination of oxygen with the substance burned. A new product is formed by the combination. If an insufficient amount of oxygen is present, smoke is formed.
>
> 5. The combination of oxygen with a substance produces heat.
>
> The ideas listed above furnish the basis for the check in the table which is attached.[1] This table was made by first checking the points given in paragraph 1 and then combining them under the five ideas listed in this paragraph.
>
> An analysis of the points enumerated in paragraph 1 indicates that too much detail was included. For example, it is questionable if the classification of materials into elements, compounds, and mixtures is advisable. Some detail and some definitions must be included to make the main ideas clear.
>
> In writing the papers, the instructor gave instructions to reproduce the lecture given by the instructor and to include such experiments as illustrated the main points. Most of the students took two periods to write their discussion.
>
> The first three ideas were covered by the entire class. Most of the students wrote such voluminous papers that there was a noticeable decrease in the number covering the last two points. I am certain that a larger number were familiar with these ideas than the analysis shows, because when questioned concerning their omission they were able to give satisfactory answers. It is a question if this type of paper measures the efficiency of the presentation as well as answers to certain definite questions.

There were sixty-four pupils in three divisions. A summary of the results follows:

Item	No. Understanding
1	64
2	63
3	63
4	54
5	51

Items 4 and 5 were then re-presented. It should not be understood that the technique stops here with this unit. There will now be a week or more in which the class will do a great deal of supervised study, gradually assimilating the whole principle of combustion and its implications in the elementary chemistry of elements, compounds, and mixtures. Finally, there will be either written or oral recitation upon the topic as a whole, each pupil taking the floor for a talk, reversing in some sense the teacher's presentation, or else writing a fuller paper covering the ground.

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[1] Lack of space precludes the printing of Mr. Beauchamp's full tabular analysis.

The effect of this kind of procedure upon the pupil's powers of concentration is marked. It is an achievement for a seventh-grade pupil to listen closely enough for thirty-five minutes to be able thereafter to reproduce in substance the content of the lecture. In supervised study, the pupils gain power to apply themselves over a long period by simply having the experience of doing so.

The question naturally arises at once, What provisions can be made for differences in learning-rate under a procedure which has mastery as its objective?

In the first place, such differences are not nearly so marked as in the case of a lesson-learning procedure. As I have suggested in the preceding article, differences in mentality which reveal themselves as differences in rate of learning are not nearly so important as intellectual differences consequent on different degrees of approach to mastery. If the reader will consult also the tables in my article in the January number of the *School Review*, he will, I think, be impressed by the fact that high mentality by no means corresponds to efficient and rapid learning. We may reasonably conjecture, too, that those obscure differences in individual equipment which we group together under the head of interest have much to do with differences in rate of learning. Be that as it may, if our theory is sound, mastery by all pupils—save the genuine problem cases—should eliminate a large class of marked differences in progress through a given unit. And such appears to be the case at this early stage of our experiment. As training goes on, the rate of learning of the majority of a class seems to be materially nearer together than formerly.

None the less, a few individuals are always conspicuously more rapid learners than the remainder of the class, and a few others are capable of much more and much better work. And there are usually a comparatively small number, a decreasing number, I think, of laggards. Of course, provision must be made for the unusually capable. Under lesson-learning procedure, these would have been in many cases in the A group and that would be the end of it. To meet the situation, we have devised a plan of excess-credit units. A concrete case will illustrate.

A division in chemistry under Mr. V. C. Lohr was working on the unit hydrogen. A boy who seems to be possessed of a special talent for and special interest in chemical studies completed the unit earlier than the others. He was assigned, or selected under guidance, the unit hydrolization of oils and greases. This unit was worked up with a large degree of independence, though under the guidance of the instructor. In the end he produced a paper on the subject which was a very creditable piece of work. Formerly, he would have received an A grade for doing precisely the same work as the others. Now, he receives unit credit for the work of the class and excess credit for his further and additional work. In the end, he knows his hydrogen as well as the others and knows a great deal more about it. He has also received invaluable training in independent study at high-school level. Another does a good piece of gravimetric work with the sensitive balance.

An excess-credit unit is not necessarily finished at the same time when the rest of the class finishes its fundamental unit. A pupil may continue work on a given excess-credit unit for a month or more.

Of course, it is entirely possible to excuse the more rapid workers, particularly when individuals need more time in other subjects. It is also possible to assign excess work in line ahead into the next course so as to enable a pupil to shorten his high-school career. With unusually mature students the latter course is no doubt often desirable. With the ordinary high-school student, certain factors depending on the different kinds of maturity ought to be taken into consideration.

We may tentatively set up four kinds of maturity—intellectual, mental, physical, and social (sophistication). Now, there seems to be no constant relation between these four types except that between physical and mental maturity, which are perhaps only different aspects of the same thing. Intellectual maturity, that is, completion of general education, may come at any time within pretty large limits and, of course, may never be reached. Indeed, in the case of the great majority of the race it never is reached. Social maturity, the other element which depends entirely on environmental influences, may also vary within wide limits. The boy who is thrown on his own resources early in life becomes sophisticated much earlier than the sheltered youth of the comfortable home. Judging from observations in the field of industry and the street trades, the present writer thinks that sophistication may take place as early as ten years of age or thereabout. There is undoubtedly variation in the chronological age of mental and physical maturity, but the variation tends to be overestimated, and in the majority of cases individuals seem to reach the period of slow development at about eighteen.

There is no advantage in reaching intellectual maturity prior to the arrival of mental maturity, whenever the latter may come. Accordingly, whatever time is gained before eighteen or thereabout is, *in most cases*, more wisely devoted to broadening intellectual equipment and training than to hastening intellectual maturity. Under the conditions prevailing in our laboratory, with its junior high school and junior college courses, normal completion of the typical high-school curriculum is expected to occur at about sixteen years of age and completion of the junior college at about eighteen. We are therefore not anxious to hurry pupils through the course.

Again, it is not wise to send young people away to the relatively independent life of the college prior to social maturity, the time when the youth has balance-wheel enough to be trusted. Again, young people differ very greatly in this respect and, as we know, some of them never become fully mature. But, on the whole, the prevailing college practice which places sixteen as the minimum age of admission is probably wise and probably founded on actual life-conditions.

Setting up a mastery objective as the standard, one naturally asks, Will you not get a prodigious number of failures? That all depends upon the fidelity with which the technique and the procedure are lived up to by the teacher. At the end of our first half-semester, we find 1,874 possible ratings in the school. Of these 123 are rated failures, or 6.5 per cent. There may be a different story as the experiment proceeds. But a very considerable proportion of these would not be considered failures on the ordinary working system.

Another point yet to be settled is the degree to which pupils retain mastery. In some cases, notably the language arts, we shall be unable to draw any valid conclusions until long after pupils have left us. Power to read French or translate Latin or to write correct English is not lost at the end of the semester (or year) or course in which that power is gained. In mathematics and the content subjects, the case is different, but there is little reason to expect that retention of matter acquired at mastery level will be less than retention acquired in process of lesson-learning with daily marks.

A final question will bear upon ground covered, and the answer here is both yes and no. If you mean by ground covered the number of principles covered, the answer is that not so much ground is covered to date as in lesson-learning when the assimilative material for a year is the thing fixed and the class is carried through with quantity in this sense as the objective and the individuals are rated in terms of percentages. If you are thinking of principles taught and mastered by every pupil, of course, more ground is covered. If you have in mind quantity of solid reading done, very much more ground is covered. And, finally, the excess-credit pupils learn a materially larger body of principles than is contemplated in the ordinary corresponding course in lesson-learning.